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ABSTRACT

A literature search identified 14 studies that were examined concerning keyboarding and computer anxiety. Although research on the relationship between keyboarding skills and computer anxiety is scarce, studies are being conducted to measure the effects of basic keyboarding skills on increased productivity. In addition, research is being performed on the effects of anxiety and its remediation through training. The research reviewed indicates that keyboarding is a basic skill related to the efficient use of computers. Familiarity with this skill, in turn, stimulates interest and enables concentration to be focused on the task to be accomplished, thereby increasing awareness and understanding about computers and decreasing anxiety. One study found that although keyboarding skills did not lead to conceptual understanding of computers, typists were significantly more likely to understand future office computer use than nontypists. In contrast to the lack of literature on formal research relating keyboarding skill to lessening of computer anxiety is the availability of articles stressing the benefits of implementing a program in basic keyboarding skills as a prerequisite to computer use, but these benefits are not quantified. (32 references.) (KC)

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What Research Says about Keyboarding Skills and Computer Anxiety

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Perhaps the greatest impact of computers has been on business. The areas of research and development, engineering, manufacturing, distribution, communication, recording and reporting have all undergone significant changes in the conversion from manual to automated systems necessary to meet the demands placed on a successful enterprise for increased profits and growth.

The transition from an industrial age to an information society has caused people and organizational departments to become increasingly dependent on the capabilities of information processing. This requires the total involvement of all employees. Economics, people and performance are no longer regarded as separate entities; they are integral parts of the administrative function operating as a single unit.

The 1980's marked the explosion of computer technology. In just a few years, the expansion of the information processing industry and technological development has grown to such a size and capability that it has had a tremendous impact on everyone's business and personal lives. Automation has forced people to interact with computers and will mean that each person will be developing their own method for learning the keyboard. The majority of these methods will be the hunt-and-peck variety unless keyboarding skills are acquired.

Keyboarding is defined as the act of entering alphanumeric data

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on a stationery desk-top unit. The speed at which one enters data is often measured in gross words a minute (GWAM), each word equalling five characters or spaces. Since only the speed, rather than accuracy, of entering data is measured, the primary goal is to develop automatic stroking habits, allowing learners to concentrate on the ideas being expressed rather than the keyboarding process.

There seems to be a continuing debate regarding the importance of keyboarding skills for computer users. There are those who believe that keyboarding is a basic skill necessary for communicating with a computer. They state that, with the widespread use and projected growth of computer technology, it is beneficial to learn the skill of keyboarding in order to take advantage of the features of the computer, to save time, reduce the number of errors made by focusing attention on the task to be accomplished, and improve the quality of the work being created, thereby producing gains in efficiency and productivity as well as a sense of personal accomplishment.

Yet there are others who are adamant about preserving the hunt-and-peck method of keyboard proficiency, responding that it has adequately served the needs of countless computer users. They are comfortable with this method and do not wish to change.

The rapid adoption of computer-related technology is requiring the learning of additional skills but, unfortunately, the acquisition of these skills has not kept pace with the adoption rate. True, keyboarding is not an easy skill to learn, but extensive use of the computer without this training develops bad habits which may become difficult or even impossible to break for those receiving keyboard instruction at a later time. People who use the hunt-and-peck method

develop high levels of frustration by not being able to produce information quickly enough due to their unfamiliarity with the keyboard. They develop their own style of inefficiency which becomes time-consuming and costly. This, in turn, fosters feelings of anxiety, hostility and resistance to technology in general.

While attitudes and beliefs regarding computers function as outcomes of experience, failure to acquire the basic skills necessary to function in a computerized society acts as a major disadvantage. Keyboarding skills are imperative. With the continued growth of the information age and technological development, everyone can expect to use the keyboard during some part of their lifetime.

Although the availability of research on the relationship between keyboarding skills and computer anxiety is scarce, studies are being conducted to measure the effects of basic keyboarding skills on increased productivity. In addition, research is being performed on the effects of anxiety and its remediation through training. As the usage of technology continues to increase, more studies are beginning to accumulate. Current research on keyboarding and computer anxiety is summarized here.

Recognizing the need to teach keyboarding skills at younger ages, Frankeberger (1985) examined the effects of teaching keyboarding in the early grades. The subjects were 16 fourth- and fifth-grade students who volunteered to devote one half-hour after school for eight weeks to learn keyboarding skills for use on their personal and school computers. Emphasis was placed on proper hand position, even stroking, manual dexterity and keeping the eyes on the copy while providing students a firm keyboarding background. The success of the

program was determined through teacher observations of student enthusiasm and motivation towards the instruction and the demonstration of the correct use of keyboarding skills.

Due to the increased popularity of the home computer and availability of educational software, classroom microcomputers are being used in the elementary and junior high schools in a variety of ways. Davis and Little (1984) studied the relationship between keyboarding and computer efficiency in students from grades 7-11. The sample consisted of 116 gifted students enrolled in three classes of keyboarding for computers. All but two of these students had had previous training in personal typing but the majority of students had adopted the habit of looking at the keys while typing prior to enrolling in the class. No formal grades were assigned, however, instructors in the course observed student progress and gave immediate feedback. Near the end of the course, 75 of the students completed and returned a one-page questionnaire. The majority of respondents were from grades 7-9 which may have resulted from no keyboarding course being offered in that age group. Scores on timed writings ranged from 9 to 49 GWAM for those students who had no previous typing experience and 80 for one student who had. It was believed by both students and instructors that the course provided the necessary base from which to build a skill demanded by the computer age.

Many schools do not have sufficient computers to allow each student to work on separate equipment. Sharing classroom computer equipment is common, suggesting the importance of proper planning for the utilization of available resources. Wronkovich (1988) examined the relationship between early keyboard instruction and computer

proficiency. This study was conducted during the spring of 1985 and the GWAM scores compared on the same groups during the spring of 1986. Both treatment and control groups consisted of 25 randomly-selected fifth and sixth grade students who had no prior keyboarding experience. The treatment group participated in a five-week keyboard instructional class. Results indicated that students were generally interested in computers but that interest was governed by many extraneous factors and not merely the ability the use the keyboard of the machine. While there was no statistically significant relationship between early keyboard training and performance in computer courses, teachers did report that students who were proficient with the keyboard entered data more efficiently in class.

Individual differences are important variables with regard to student achievement. Miller (1970) reported on the effects of programming aptitude, typewriting skill and initial achievement on the rate of performance and achievement of programming skills. This study identified the areas of computer programming aptitude, typing skill and initial achievement. Twelve advanced undergraduate students were randomly selected from a population of 58. To minimize the number of extraneous variables, instruction was carried out in a closely-monitored lab environment. Subjects were given four 1-hour days learning the BASIC programming language, one hour on the knowledge test and two 2-hour periods solving two equally difficult programming problems. Results showed that programming aptitude is a significant determinant of the level of performance. Although typing ability did not appear to significantly affect higher achievement, there was substantial evidence to indicate that keyboard skill had an

important influence on the rate of performance.

Noting the fact that many employees are deficient in computer use skills, Massey and Engelbrecht (1987) performed a study identifying the relationship between typing and/or word processing skills and conceptual understanding of computer use. A total of 234 undergraduate students, representing over 14 different majors were surveyed in business classes. Conceptual understanding and application were determined by a student questionnaire. For analysis, students were first divided into typing and non-typing groups. The second separated the groups based on their reported use of word processors, and the third investigated the combination of typing and word processing experience. Results showed that typists and word processors seem to have a greater appreciation of computer application. Individuals with both typing and word processing ability were more likely to understand computer use and its application than those with neither of these characteristics.

Computer anxiety, computer phobia and micro phobia have been described as the hesitance or fear of using computers that involves an array of emotional reactions to include fear, apprehension, anxiety, personal threat and a distrust of technology, impeding the development of positive attitudes toward computers. This is a major stumbling block that hinders progress toward computer literacy or knowledge about computers.

It is still unclear as to what personal characteristics correlate with computer anxiety. Gressard and Loyd (1987) did a study on the effects of math anxiety and sex on computer literacy, computer anxiety, computer confidence and computer liking. The subjects chosen

were 356 students from junior high school through college level with computer experience ranging from less than a week to more than a year. These students were then divided into three groups by grade level. Computer attitudes were measured with the Computer Attitude Scale (CAS) and Math Anxiety was measured using a modified version of the Math Anxiety Scale (MAS). Findings showed that the elements of more computer experience and less math anxiety contributed to more positive computer attitudes. The correlation between sex and both variables of math anxiety and computer attitudes was not found to be statistically significant.

In the past, the issue of gender equality in quantitative skills has been explored extensively, however the rapid introduction of classroom microcomputers has suggested otherwise. Chen's (1986) study examined gender differences in computer attitudes and experiences in adolescents. A survey instrument was administered to 1,138 high school students in five Silicon Valley high schools. Findings showed that adolescent males had greater exposure to computers through programming classes and voluntary use of computers such as those at home. Males also had more positive attitudes and confidence in using computers. Males and females had similar levels in interest and enrollment in classes using computers.

There is growing evidence that women are falling behind in the mastery of computer skills. Dambrot, Watkins-Malek, Silling, Marshall and Garver (1985) investigated sex differences in computer attitude and aptitude and the relationship of these variables, math aptitude, math anxiety and scholastic achievement to computer involvement. Selected were 599 female and 342 male students randomly chosen from an

introductory psychology class who were administered the Computer Attitude Scale (CATT), Fennema-Sherman Math Anxiety Scale, Computer Aptitude Scale (CAPT) and American College Testing Program Mathematics Test (ACTM). Results showed that females had more negative attitudes toward computers, scored lower in computer aptitude and had less prerequisite math coursework and ability. More males than females had completed computer courses and had knowledge of a computer language. Computer aptitude was strongly related to math ability and experience whereas computer attitude was related to math anxiety and computer experience. Sex and computer attitude consistently discriminated between groups differing in computer involvement.

In the enthusiasm for the use of high-tech equipment, user reactions are often overlooked. Noble & O'Connor's (1986) study was done on the assessment of attitudes toward technology and their impact on the use of the online public access catalog (OPAC). Subjects were users of the OPAC and the survey questionnaire was administered online, on the same terminal as the catalog software. A total of 271 sets of survey data was collected over a three-week period. Results showed two distinct groupings of users: "reluctant OPAC users," who are generally older, have difficulty remembering search commands, who use computers infrequently and have a general distrust of computer technology, and "naive OPAC enthusiasts," who are younger, more frequent library users and are students of arts and humanities.

Resistance is closely related to the fear of anything new or unfamiliar. Cambrie and Cook (1987) did a study on assessing and remediating computer anxiety. Subjects consisted of a heterogeneous voluntary population of 865 students ranging from ages 8 to 80 who had

signed up for a week-long summer computer course. This study consisted of a pretest posttest two-treatment design. It was determined that females described themselves as more computer anxious than males. Adults, more than children and teenagers, appeared to be more fearful about the use of computers, but exposure to computers during the course reduced the incidences of anxiety about computers. This lends further support to the notion that computer anxiety can be remedied through positive computing experiences.

The fostering of positive attitudes has been a chief, early goal in the development of computer literacy. Chapline and Turkel (1986) examined the effects of a 15-week computer program on attitudes toward computers. Subjects were 73 female elementary teachers who had little exposure to computers and no previous computer courses. A comparison group was also selected and consisted of 59 students at the same point in the professional education sequence. Achievement was measured by responses to the Minnesota Computer Literacy and Awareness Assessment (MCLAA) and to a student questionnaire. Data was collected in the fall and spring semesters and follow-up data was collected six months after the course by interviewing a random sampling of 20 applicants. Posttest results in both the fall and spring semesters showed significant reductions in anxiety and an increase in a sense of personal accomplishment upon completion of the course.

Despite the importance placed in the computer industry, it has continually suffered from a shortage of skilled personnel. A study by Durndell, Macleod and Siann (1987) examined the effects of gender, major course of study and year in school on experience, attitudes and computer literacy. Subjects were 928 students chosen randomly in the

areas of computer science, math, science and social science who were administered a questionnaire early in their first term. The same questionnaire was then administered to the same students in their final year of school. Findings showed that students in computer science were more knowledgeable about and had more experience with computers. Males and females, regardless of major course of study showed no significant differences in attitudes toward technology.

Focusing on the changing nature of work, Reese (1988) examined the influence of occupation on attitudes toward computers. In 1986, data was gathered from a stratified sample of 1,000 respondents as part of the Texas Poll. Respondents were sent a questionnaire which asked them questions about their occupation, usage of new technologies and attitudes towards science and technology. Findings showed that attitudes were significantly affected by one's occupation. Higher level knowledge workers who stand to benefit most from technology tend to be more optimistic toward science and technology and the acquisition of communication technologies.

Literature on the relationship between keyboarding skills and attitudes about computers is scarce. However, the available literature that was reviewed indicates that keyboarding is a basic skill related to the efficient use of computers. Familiarity with this skill, in turn, seeks to stimulate interest and enables concentration to be focused on the task to be accomplished, thereby increasing awareness and understanding about computers and decreasing anxiety. One article reviewed indicated that although keyboarding skills did not lead to conceptual understanding of computers, typists were significantly more likely to understand future office computer

use than non-typists.

In contrast to the lack of literature on formal research relating keyboarding skill to lessening of computer anxiety is the availability of articles stressing the benefits of implementing a program in basic keyboarding skills as a prerequisite to computer use, but these benefits are not quantified. The available literature however, does serves as a foundation on which to build.

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